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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/661,844	09/12/2003	Thomas Louis Toth	135486	8543

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EXAMINER

KIKNADZE, IRAKLI

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 03/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/661,844

Applicant(s)

TOTH ET AL.

Examiner

Irakli Kiknadze

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>09/12/2003</u> | 6) <input type="checkbox"/> Other: ____  |

## DETAILED ACTION

### *Claim Objections*

1. Claim 13 is objected to because of the following informalities: in lines 1-3, "said wedge shaped filter " lack antecedence. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Grossman (US Patent 2,225,940).

With respect to claim 1, Grossman teaches a method of correcting the distributions of X-rays, the method comprising: positioning a filter (96) having an anode side and a cathode side between an X-ray source (90) and an X-ray detector (not shown in Figures), wherein the cathode side has a higher attenuation coefficient than the anode side, to at least partially compensate for the target angle heel effect (Fig.4; page 3, column 2, lines 3-9).

With respect to claim 2, Grossman teaches that the positioning a filter comprises positioning a wedge shaped filter (as wedge-shape aluminum part or section (102) of a filter (96)), wherein the wedge shape (102) comprises a horizontal top, a bottom, a first vertical side and a second vertical side, wherein the horizontal top and the bottom are

not parallel and wherein the first vertical side and the second vertical side are unequal in length (Fig. 4).

4. Claims 1, 2 and 9-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Minami et al. (US Patent 4,101,766).

With respect to claim 1, Minami teaches a method of correcting the distributions of X-rays (as at least partially compensating for an X-ray tube target angle heel effect; column 1, line 50 - column 2, line 14), the method comprising: positioning a filter (as filter (70) of filter means (53)) having an anode side and a cathode side between an X-ray source (52) and an X-ray detector (58), wherein the cathode side has a higher attenuation coefficient than the anode side, to at least partially compensate for the target angle heel effect (column 5, lines 54-67 and column 6, lines 52-65).

With respect to claim 2, Minami teaches that the positioning a filter comprises positioning a wedge shaped filter (70), wherein the wedge shape (70) comprises a horizontal top, a bottom, a first vertical side and a second vertical side, wherein the horizontal top and the bottom (70a and 70b) are not parallel and wherein the first vertical side and the second vertical side are unequal in length (Fig. 7b; column 6, lines 52-65).

With respect to claims 9 and 10, Minami teaches that the second vertical side may comprise a length between 0.5mm and 1.5mm thicker than the first vertical side or the second vertical side may comprise a length of 1mm greater than the first vertical side (column 6, lines 55-60).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minami et al. (US Patent 4,101,766) in view of Albagli (US Patent 6,418,193 B1).

With respect to claim 3, teaches claimed invention except for depositing the filter directly to the window. Albagli teaches an X-ray tube (12) arrangement with a filter (14), wherein " the filter (14) is preferably placed" in proximity e.g. in a range between about 0" and 8" from the exit port of the X-ray tube (column 2, lines 60-67). This arrangement permits substantially intercept almost all X-rays exiting the window while reducing effects of scatter, allowing to save space and does not present significant issues of increased cost or restructuring of the X-ray apparatus (column 3, lines 1-12). It would have been obvious to one of ordinary skill in art at the time the invention was made to depositing the filter directly to the X-ray exit window because it would substantially intercept almost all X-rays exiting the window reducing effects of scatter, allowing to save space and cost of the X-ray apparatus while filtering exiting X-rays as to remove certain effects of the physical characteristics of the X-ray tube.

With respect to claims 4 and 5, Minami teaches that the filter is formed from aluminum and/or copper (column 7, lines 18-25).

7. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minami et al. (US Patent 4,101,766) in view of Koller et al. (US Patent 4,107,562).

With respect to claim 6, Minami shows (Fig. 6) that the wedge shaped filter positioned proximate to the X-ray tube separated by a gap but silent about an arrangement wherein the filter is separated from an X-ray tube window by an oil gap. The X-ray tubes surrounded by a dielectric fluid, such as oil, for example, which flows through the X-ray tubes housing is well known in the X-ray art. Koller teaches an X-ray beam generator (104) comprising: a filter (56) proximate an X-ray tube casing (22), wherein the filter (56) is separated from an X-ray tube window (34) by an oil gap (32) (Fig.1; column 3, lines 10-13 and column 4, lines 12-15). This arrangement allows the dielectric oil (32) that circulates throughout the casing (22) to cool the operational X-ray tube (26) and insulate the casing (22) from the high electrical charges within the X-ray tube (26). It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the X-ray tube teachings of Koller in the invention of Minami because it would provide the wedge filter to the close proximity to the X-ray exit window, substantially intercepting almost all X-rays separated only by oil gap reducing effects of scatter, allowing to save space and simplify the X-ray tube arrangement while filtering exiting X-rays as to remove certain effects of the physical characteristics of the X-ray tube.

With respect to claims 7 and 8, Minami teaches that the positioning a wedge shaped filter comprises positioning aluminum or copper wedge shaped filter (column 6, lines 52-65 and column 7, lines 18-23).

8. Claim 11 is rejected under 35 U.S.C. 102(b) as being anticipated by Minami et al. (US Patent 4,101,766) in view of Moore (US Patent 4,181,858).

With respect to claim 11, Minami teaches claimed invention except for a filter having a concave-wedge shape. Moore teaches positioning a concave-wedge shape filter (26) between an X-ray source (14) and an X-ray detector (18) for correcting the distributions of X-rays in a transmitted dose reaching the detector (16). The concave-wedge shaped filter (26) has a horizontal top, concave bottom, a first vertical side and a second vertical side, wherein the first vertical side and the second vertical sides are unequal length (Figs.1 and 2a). It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ teachings of Moore in the system of Minami to provide the concave-wedge shaped filter arrangement because it would allow to correct the intensity distributions of X-rays allowing to at least partially remove certain effects of the physical characteristics of the X-ray tube.

9. Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grossman (US Patent 2,225,940) in view of Albagli (US Patent 6,418,193 B1).

With respect to claims 12-15, Grossman teaches an X-ray tube (2) comprising: an anode; a cathode; an X-ray exiting window; and a wedge shaped filter, made from aluminum or copper, placed near the window, wherein the wedge shaped filter comprises a horizontal top, a bottom, a first vertical side and a second vertical side, wherein said horizontal top and said bottom are not parallel and wherein the first vertical side and the second vertical side are unequal in length (Fig.1; page 2, column 1, lines

45-54, page 3, column 1, lines 23-25 and column 2, lines 8-11). Grossman is silent about beryllium window and depositing the filter directly to the window. Albagli teaches an X-ray tube (12) arrangement with a filter (14), wherein " the filter (14) is preferably placed" in proximity e.g. in a range between about 0" and 8" from the exit port of the X-ray tube (column 2, lines 60-67). This arrangement permits substantially intercept almost all X-rays exiting the window while reducing effects of scatter, allowing to save space and does not present significant issues of increased cost or restructuring of the X-ray apparatus (column 3, lines 1-12). It would have been obvious to one of ordinary skill in art at the time the invention was made to use beryllium as an excellent X-ray transmissive material for the window for X-ray tube. Further, depositing the filter directly to the X-ray exit window would substantially intercept almost all X-rays exiting the window reducing effects of scatter, allowing to save space and simplify the X-ray tube arrangement while filtering exiting X-rays as to remove certain effects of the physical characteristics of the X-ray tube.

10. Claims 16, 17, 21-25, 27, 28 and 32-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koller et al. (US Patent 4,107,562) in view of Minami et al. (US Patent 4,101,766).

With respect to claims 16, 17, 27 and 28, Koller teaches an imaging system (as a CT imaging system) for scanning an object (64) comprising: a radiation source (20); a radiation detector (as an array (66) of detectors (68)) positioned to receive radiation from said radiation source (20); a computer (72); and a filter (57) positioned between



the source (20) and the detector (68). Koller is silent about a filter, wherein a cathode side of the filter has a higher attenuation coefficient than an anode side, to at least partially compensate for a target angle heel effect. Minami teaches correcting the distributions of X-rays (as at least partially compensating for an X-ray tube target angle heel effect; column 1, line 50 - column 2, line 14) comprising: a filter (as filter (70) of filter means of (53)) having an anode side and a cathode side between an X-ray source (52) and an X-ray detector (58), wherein the cathode side has a higher attenuation coefficient than the anode side, to at least partially compensate for the target angle heel effect (column 5, lines 54-67 and column 6, lines 52-65). The filter comprises a wedge shaped filter (70), wherein the wedge shape comprises a horizontal top, a bottom, a first vertical side and a second vertical side, wherein the horizontal top and the bottom (70a and 70b) are not parallel and wherein the first vertical side and the second vertical side are unequal in length (Fig. 7b; column 6, lines 52-65). It would have been obvious to one of ordinary skill in art at the time the invention was made to employ teachings of Minami in the system of Koller because it would allow to provide the X-ray source with the wedge shaped filter arrangement allowing to at least partially remove certain effects of the physical characteristics of the X-ray tube such as a target angle heel effect.

With respect to claims 21 and 32, Koller teaches that the filter being positioned proximate an X-ray tube casing (22) and filter is separated from an X-ray tube window (34) by an oil gap (Fig. 1; column 4, lines 12-15).

With respect to claims 22, 23, 33 and 34, Minami teaches that the wedge shaped filter (70) may be formed of, for example, aluminum (column 6, lines 54-57) or copper

(column 7, lines 18-22). It would have been obvious to one of ordinary skill in the art at the time the invention was made to properly select the X-ray filter material known in the art that would provide desirable attenuation range required for a specific application.

With respect to claims 24, 25, 35 and 36, Minami teaches that the second vertical side may comprise a length between 0.5mm and 1.5mm thicker than the first vertical side or the second vertical side may comprise a length of 1mm greater than the first vertical side (column 6, lines 55-60). It would have been obvious to one of ordinary skill in the art at the time the invention was made to properly select dimensions of the X-ray filter known in the art that would provide desirable attenuation range required for a specific application.

11. Claims 18-20 and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koller et al. (US Patent 4,107,562) in view of Minami et al. (US Patent 4,101,766) and further in view of Albagli (US Patent 6,418,193 B1).

With respect to claims 18 and 29, Koller in view of Minami teaches claimed invention except for depositing the filter directly to the window. Albagli teaches an X-ray tube (12) arrangement with a filter (14), wherein "the filter (14) is preferably placed" in proximity e.g. in a range between about 0" and 8" from the exit port of the X-ray tube (column 2, lines 60-67). This arrangement permits substantially intercept almost all X-rays exiting the window while reducing effects of scatter, allowing to save space and does not present significant issues of increased cost or restructuring of the X-ray apparatus (column 3, lines 1-12). It would have been obvious to one of ordinary skill in the art at the time the invention was made to depositing the filter directly to the X-ray exit

window because it would substantially intercept almost all X-rays exiting the window reducing effects of scatter, allowing to save space and cost of the X-ray apparatus while filtering exiting X-rays as to remove certain effects of the physical characteristics of the X-ray tube.

With respect to claims 19, 20, 30 and 31, Minami teaches that the wedge shaped filter (70) may be formed of, for example, aluminum (column 6., lines 54-57) or copper (column 7, lines 18-22). It would have been obvious to one of ordinary skill in art at the time the invention was made to properly select the X-ray filter material known in the art that would provide desirable attenuation range required for a specific application.

12. Claims 26 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koller et al. (US Patent 4,107,562) in view of Minami et al. (US Patent 4,101,766) and in further view of Moore (US Patent 4,181,858).

With respect to claims 26 and 37, Koller in view of Minami teaches claimed invention except for a concave-wedge shaped. Moore teaches positioning a concave-wedge shape filter (26) between an X-ray source (14) and an X-ray detector (18) for correcting the distributions of X-rays in a transmitted dose reaching the detector (18). The concave-wedge shaped filter has a horizontal top, concave bottom, a first vertical side and a second vertical side, wherein the first vertical side and the second vertical sides are unequal length (Figs. 1 and 2a). It would have been obvious to one of ordinary skill in art at the time the invention was made to employ teachings of Moore to provide the concave-wedge shaped filter arrangement in the system of Koller in view of Minami

because it would allow to at least partially compensate for asymmetric intensity distribution of X-rays while partially removing certain effects of the physical characteristics of the X-ray tube.

### ***Conclusion***

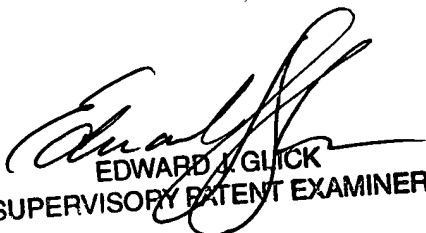
13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irakli Kiknadze whose telephone number is 571-272-2493. The examiner can normally be reached on 9:00- 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Irakli Kiknadze  
March 21, 2005

IK

  
EDWARD J. GLICK  
SUPERVISORY PATENT EXAMINER